Express Mail Label No. EL 738 149 221 US

Date of Mailing MARCH 20, 2001

PATENT
Case No. DP-304380
(7500/52)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
APPLICATION FOR UNITED STATES LETTERS PATENT

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TITLE: STRUT SPRING SEAT SUPPORT

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DP-304380

STRUT SPRING SEAT SUPPORT

TECHNICAL FIELD

The technical field of this disclosure is vehicle suspension systems, particularly, a strut spring seat support to support a coil spring and attachable to other vehicle suspension system components.

BACKGROUND OF THE INVENTION

In present vehicle suspension systems, the lower end of a coil spring is supported by a spring seat. The spring seat is slipped over and welded to the reservoir tube, which is a major structural part of the automotive strut damper. The most common method of affixing the spring seat to a reservoir tube is using an arc (MAG) weld. Separate stab bar brackets for attaching the assembly to the stabilizer bar and knuckle attachments for attaching the assembly to the wheel assembly are also welded to the reservoir tube.

For example, the prior art conventional spring seat in a vehicle suspension assembly shown in **FIGS. 1** and **2** provides a coil spring suspension for a vehicle wheel assembly **10**. The strut module **20** can include a reservoir tube **22**, a coil spring **24** supported by a conventional spring seat **26**, a stab bar bracket **28**, and a knuckle attachment **30**. The conventional spring seat **26**, stab bar bracket **28**, and knuckle attachment **30** are welded to the reservoir tube **22**. Welding the conventional spring seat **26** requires the work piece to be rotated, since the reservoir tube **22** is cylindrical. The strut module **20** attaches to the wheel assembly **10** at the knuckle attachment **30** and stab bar bracket **28** attaches to the stabilizer bar (not shown).

The spring seat assembly process is complicated by the part geometries and welding involved. Clearance is required between the spring seat and stab bar bracket to allow assembly. The spring seat hub must be directed downward to provide a welding surface. Welding spatters on the spring seat and reservoir tube surfaces may raise quality issues. The spring seat arc welding process is the longest procedure in the reservoir assembly process, requiring two spring seat welders in a cell in order to keep assembly time within reasonable limits. The parts must be rotated during arc welding to weld to the cylindrical reservoir tube. In addition, the arc welding process requires expensive welding consumables, such as gas mixture and welding wire.

The present spring seat design may also have problems from certain uses. High loads or defective welds may allow the spring seat to dislocate toward the bottom of the strut, causing potential tire damage. Loads are transmitted from the coil spring through welds to the reservoir tube, stressing the welds.

It would be desirable to have a strut spring seat support that would overcome the above disadvantages.

SUMMARY OF THE INVENTION

One aspect of the present invention provides a strut spring seat support for a vehicle suspension assembly that combines components to simplify the assembly process.

Another aspect of the invention provides a strut spring seat support for a vehicle suspension assembly that allows use of projection welding methods during assembly.

Another aspect of the invention provides a strut spring seat support for a vehicle suspension assembly that has a longer lifetime due to improved load transfer to reduce the stress on welds.

The foregoing and other features and advantages of the invention will become further apparent from the following detailed description of the presently preferred embodiments, read in conjunction with the accompanying drawings. The detailed description and drawings are merely illustrative of the invention rather than limiting, the scope of the invention being defined by the appended claims and equivalents thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a prior art spring seat in a vehicle suspension assembly.

FIG. 2 shows a prior art conventional damper assembly.

FIG. 3 shows a perspective view of an embodiment of the strut spring seat support for a vehicle suspension assembly made in accordance with the present invention.

FIG. 4 shows a perspective view of an embodiment of the strut spring seat support for a vehicle suspension assembly made in accordance with the present invention.

FIGS. 5 and **6** show a perspective view of an alternate embodiment of the strut spring seat support for a vehicle suspension assembly made in accordance with the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 3 illustrates one embodiment of a strut spring seat support for a vehicle suspension assembly. A spring seat assembly **40** can comprise a lower spring seat **46** and a spring seat bracket **47**. The spring seat bracket **47** can further comprise a mounting bracket portion **42** and a stabilizer bar bracket portion **44**. The mounting bracket portion **42** is adapted to attach to the wheel assembly of the vehicle suspension system and the stabilizer bar bracket portion **44** is adapted to attach to the stabilizer bar of the vehicle suspension system. (See **FIG. 1**)

In one embodiment shown in **FIG. 3**, the mounting bracket portion **42** and the stabilizer bar bracket portion **44** can be formed from a single piece of metal. In an alternate embodiment, the mounting bracket portion **42** can be attached to the stabilizer bar bracket portion **44** by welding. The stabilizer bar bracket portion **44** can have a shelf **45** substantially perpendicular to the axis of the reservoir tube **48** for attaching and supporting the lower spring seat **46**. The spring seat assembly **40** can be welded to the reservoir tube **48** using linear welds, where the mounting bracket portion **42** and the stabilizer bar bracket portion **44** contact the reservoir assembly along an axial line on the reservoir tube's surface at the mounting bracket edge **41** and the stabilizer bar bracket edge **43** (see **FIG. 4**), respectively.

Referring to **FIG. 3.**, the spring seat assembly can be assembled by welding the spring seat bracket **47** to the reservoir tube. The lower spring seat **46** can be positioned on the reservoir tube through the reservoir tube opening **52** (See **FIG. 4**) with the lower spring seat **46** adjacent to the shelf **45**. The lower spring seat **46** can then be welded to the shelf **45** of the spring seat bracket **47**.

Referring to **FIG. 4**, where elements shared with those shown in **FIG. 3** share like reference characters, provides further detail of the lower spring seat **46**. The lower spring seat **46** can receive a coil spring (not shown). The lower spring seat **46** can comprise a circular portion **48** having a hub **50** forming an reservoir tube opening **52** disposed about the reservoir tube **48**. The circular portion **48** can include projections **54** for welding. In an alternate embodiment, the projections may be provided on the shelf **45** of the spring seat bracket **47**. The lower spring seat **46** can be attached to the stabilizer bar bracket portion **44** by projection welding. The circular portion **48** can extend substantially radially with respect to the axis of the reservoir tube **48**. In one embodiment, the lower spring seat **46** can be stamped from a single piece of metal.

In projection welding, a high density current passes through a certain localized resistance path for a given length of time to produce the heat required to create a fusion between two parent metals. High forces can be applied to control the molten area and insure proper union. With projection welding, the character and location of the weld nugget can rely upon the work material itself. The electrode can serve to carry the required current and to apply the necessary force. The electrode, additionally, can provide a means for holding the work pieces during the complete welding cycle. In joining two works parts by projection welding, one of the parts can include projections. These projections can be embossments or protrusions in the parent metal and can be created, for

example, through forming by stamping, coining, or machining. In one embodiment, the projections **54** can be formed in the stamping of the lower spring seat **46**. In alternative embodiments, other welding methods, such as spot welding, can be used to connect the lower spring seat **46** to the stabilizer bar bracket portion **44**.

FIGS. 5 and **6**, in which like elements share like reference characters, show an alternate embodiment of the strut spring seat support for a vehicle suspension assembly. The spring seat assembly **40'** provides an attachment to the stabilizer bar. The knuckle attachment can be separate from the spring seat assembly. The spring seat assembly **40'** can comprise a lower spring seat **46'** and a spring seat bracket **47'**. The spring seat bracket **47'** can further comprise a stabilizer bar bracket portion **44'**, which can be attached to the stabilizer bar of a vehicle suspension system. In one embodiment, the stabilizer bar bracket portion **44'** can be formed from a single piece of metal. The lower spring seat **46'** can be attached to the stabilizer bar bracket portion **44'** by welding. The stabilizer bar bracket portion **44'** can include an upper region **45'** substantially perpendicular to the axis of the reservoir tube **48'** for attaching and supporting the lower spring seat **46'**. The spring seat assembly **40'** can be welded to the reservoir tube **48'** using linear welds, where the stabilizer bar bracket portion **44'** contacts the reservoir assembly at portion **43'** in an axial line on the reservoir tube's surface. Knuckle attachment **30'** can be, for example, welded or slip fit to the reservoir tube **48'**. Projections **54'** can be provided on seat **46'** for attachment to the bracket portion **44'**.

While the embodiments of the invention disclosed herein are presently considered to be preferred, various changes and modifications can be made without departing from the spirit and scope of the invention. The scope of the invention is indicated in the appended claims, and all changes that come within the meaning and range of equivalents are intended to be embraced therein.